



## **CHROMOPHARE® D 660, D 540, D 510**

### **Operating instructions**

Single light and combination light

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Wir helfen***

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## **1. GENERAL**

### **1.1 Introduction**

The CHROMOPHARE® D 660, D 540 and D 510 consists of a swivel arm support, a lamp housing and a flange tube. The lamp housing is fixed to a cardanic-type support (vertical gimbal joint, horizontal gimbal joint) and can be rotated, swiveled and tilted in any direction. The height is adjusted via the 360° rotating vertical spring arm. The spatial position of the lamp is adjusted by means of the 360° rotating horizontal swivel arm.

**The special features of the CHROMOPHARE® D generation are:**

- Dents and paint scratches or chips on the light hood are eliminated. An impact-absorbent light hood made of polymer material prevents deformations and paint defects.
- Cool light in the surgical area and in the beam path of the operating lights, which is achieved by filtering out the infrared proportion by means of the proven ThermoSorb® double filter system.
- The newly designed suspension and the hand grip with a particularly wide protective collar and an integrated release mechanism, ensure a high degree of hygiene.
- Excellent depth of illumination and low shadow levels, which are achieved by modifying the light beam using reflector elements.
- In the case of failure of the main lamp, 100 percent identical light ratios are guaranteed by the lamp-swivel mechanism, which swings the reserve lamp into the position of the main lamp (D 510 optional).

**Additional special features of the CHROMOPHARE® D 660:**

- High illuminance of 160,000 lx for illuminating a deep surgical area, which is achieved with the assistance of the newly developed energy reflection technology.

**Additional special features of the CHROMOPHARE® D 540:**

- High illuminance of 145,000 lx for illuminating a deep surgical area, which is achieved with the assistance of the newly developed energy reflection technology.

**Additional special features of the CHROMOPHARE® D 510:**

- Illuminance of 130,000 lux for illuminating a deep surgical area, which is achieved with the assistance of the newly developed energy reflection technology.

**Additional optional characteristics of the CHROMOPHARE® D 510:**

- Electronic light intensity control (65,000 Lux – 130,000 Lux)
- Light field size adjustment (170 mm - 280 mm)
- Reserve bulb with automatic switch over to reserve bulb operation and LED display
- Reserve lamp that swings into the optical centre for 100 % intensity in reserve operation
- Circumferential rail for simplified handling
- Central integrated camera (optionally with fixed or adjustable zoom)
- Wall control
- EndoLite® for the illumination of the surroundings during endoscopic procedures

**1.2 Manufacturer's notes**

The manufacturer of the products specified in these operating instructions is:

**BERCHTOLD GmbH & Co. KG**  
**Ludwigstaler Straße 25**  
**Postfach 4052**  
**78505 Tuttlingen / Germany**  
**Internet: [www.BERCHTOLD.de](http://www.BERCHTOLD.de)**  
**e-mail: [Info@BERCHTOLD.de](mailto:Info@BERCHTOLD.de)**  
**Tel. +49 (0) 74 61 / 181 - 0**  
**Fax +49 (0) 74 61 / 181 - 200**

**1.3 General information**

- This user's manual is considered part of the equipment. It must be kept in the vicinity of the equipment at all times. Precise observance of the user's manual is a prerequisite for the proper use and correct operation of the equipment, which is essential for the safety of patients and operators alike.
- Only accessories which are specified in this user's manual, and which have been tested together with the equipment, may be used. If accessories are used which are not specified in the user's manual, their ability to be used in accordance with safety regulations must be proved.
- All literature relates to the equipment model and the prevailing basic safety regulations when printed. All rights are reserved for equipment, switches, procedures, software programs and names.

#### 1.4 Information about product liability

BERCHTOLD considers itself responsible for the consequences of safety, reliability and performance of the equipment only if:

- a) installation, modifications or repairs have been performed only by BERCHTOLD, or by an agent expressly authorized by BERCHTOLD to do so,
- b) the electrical installation of the room complies with regulations IEC 60364-7-10, or the national electrical code, NFPA 70x (NEC)
- c) the equipment is used in accordance with the user's manual.

#### 1.5 Incoming inspection

Please inspect the equipment and accessories immediately after receipt for any transportation damage and defects.

Claims for damage will only be valid if the vendor (BERCHTOLD) or the carrier are informed at once. A damage report must then be prepared immediately. The damage record must be submitted to the nearest BERCHTOLD representative or to BERCHTOLD directly.

When an appliance or parts of an appliance are returned to BERCHTOLD or to a BERCHTOLD service agent, the original packaging should be used where possible. The following accompanying documentation must be attached: owner's name and address, equipment number (see type plate), description of the defect.

##### 1.5.1 Permissible environment conditions

**For transport and storage** (in original packing; for maximum 15 weeks)

Ambient temperature - between -10°C and +60°C, 14 ° F and 140 ° F  
Relative air moisture - between 10 % and 85 %, no condensation  
Air pressure - between 500 hPa and 1060 hPa, 14.8 in Hg and 31.1 in Hg

**For operation**

Ambient temperature - between +10°C and +40°C, 50 ° F and 104 ° F  
Relative air moisture - between 30 % and 75 %  
Air pressure - between 700 hPa and 1060 hPa, 20.7 in Hg and 31.3 in Hg

#### 1.6 EC certification

The equipment complies with the requirements of the EC guideline regarding medical products, 93/42/EEC as well as the UL guidelines. The certification with the EC marking is located on the type plate.

## **2. BEFORE OPERATING**

### **2.1 Range of application (purpose)**

The CHROMOPHARE® light is a medical light for use in hospital treatment rooms. It is used for the local illumination of the patient's body. It may only be used in rooms which have been correctly designed out in accordance with IEC 60364-7-10, or NEC.

The CHROMOPHARE® light as a single light provides a very high degree of failure protection, as it is (optionally) equipped with automatic switch-over to a reserve lamp, electronic monitoring with a "bypass switch" and an automatic APU switch-over. However, not all components are duplicated, so that in some circumstances a failure is still possible. As a matter of principle, single lights should not be used for operations where a light failure could represent a great danger to the patient.

Light combinations with two or even three light heads provide more security against light failure and a better brightness of the operating field. They provide light from different angles and maximum protection against light failure due to the fact that components are redundant. This applies particularly when they are connected to an emergency power supply (APU) in addition to the mains supply. These combination lights may be used in all medical disciplines for the illumination of surgical areas.

### **2.2 Safety information**

- Incorrect operation and non-observance of safety measures can cause serious consequences. Therefore make sure that you have read and understood the information in your CHROMOPHARE® user's manual.
- The light is not intended for operation in areas where there is danger of explosion.
- Do not look into the illuminated light and do not put any reflective objects into the path of the beam. Because of the high illumination strength there is a danger of glare.
- The distance between the light emission surface area of the operating light and the patient surface should not be less than 60 cm in order to ensure proper illumination.
- The light must not be operated if the cover glass or the filter system is damaged or destroyed. Thermal radiation can reach the surgical area, heating up and drying out the tissue of the operation wound. If the effect is prolonged, there is even the danger of tissue necrosis.
- Do not place any objects on the lamp housing or hang objects on arms or lamp housings, as this may compromise the stability of the support and there is the danger that these objects may fall into the surgical area. Attaching or hanging heavy objects can destroy the mechanism.
- The lamp housing must not be covered while in operation, as this prevents heat exchange with the environment and could cause the surgical light to overheat.
- Collision of the supporting arms and lamp housings should to be avoided. A severe collision could result in lights being damaged or parts falling into the surgical area.
- The overlay of the light fields can cause an increase in heat generation.

## 2.3 Installation instructions

Due to their high rotational moments and self-weights, the installation and mounting of all CHROMOPHARE® lights on the ceiling of the operating room must be performed by BERCHTOLD personnel or by a contractor authorized by BERCHTOLD, in accordance to BERCHTOLD “Mounting instructions for ceiling lights”. The electrical installation must comply with the customer’s code requirements.

Incorrect assembly of the lights can result in damage to the mounting system and potential risk to the patient and staff. The on-site electric installation must be performed in accordance with IEC 60364-7-10 or NEC and include a fuse protection as well as a mains switch for a simultaneous, dual pole separation of the light. For further information, please note the mounting instructions.

## 2.4 Instructions for initial start-up

The operator may begin to use the light, after the manufacturer or supplier

- a) has carried out a performance check at the place of operation,
- b) has introduced those responsible for the operation of the light to its correct handling by means of the user’s manual.

## 2.5 Visual and performance check

Before initial start-up the manufacturer or supplier should check that the CHROMOPHARE® light has been properly installed and is in a safe and operational condition.

A visual inspection of the following points must take place:

- After switching-on the unit, light must be emitted from the main lamp, and in the case of combination lights, also from the additional lamp.
- Inspection of the light emission lens of the lamp housing  
If the light emission lens is damaged or broken, glass splinters can fall out. The light must be switched off immediately and must not be used until the defect has been rectified.
- Inspection of the reserve lamp warning indicator  
In the case of failure of the main lamp, the reserve lamp is automatically switched on and swung into the position of the main lamp (D 510 optional). The yellow warning indicator on the lamp housing illuminates to indicate this error. The defective main lamp must be replaced immediately.
- Checking the operational state of the control unit (D 510 only with option “light intensity control”)  
The individual functions must be checked by activating the appropriate keys. Faults in the main circuit of the control electronics are indicated by the red fault indicator on the control unit. In this case the light operates at its maximum luminous intensity and can no longer be controlled via the keys.
- Checking the mechanical movement mechanism of the system  
The mechanical operation of the light system is checked by swiveling and rotating the movement mechanism.



## 2.6 Cleaning, sterilization, disinfection

- All parts of the CHROMOPHARE® light can be cleaned with standard commercial cleaners on all exterior surfaces including the control unit, and disinfected with the disinfectants normally used in surgical areas.
- Only disinfectants may be used, that are certified from the manufacturer for the following materials: Polycarbonate (PC), Polyamid (PA), Polyvinylchlorid (PVC), Acrylnitril-Butadiene-Styrol-Copolymer (ABS), Polyetherimide (PEI) and Silicones.
- Cleaning, disinfectant and sterilization of the sterilizable handles  
The sterilizable handles are made of heat-resistant, impact-resistant plastic (PEI). They can be cleaned with mild alkaline cleaners without active chlorine. The cleaners must be thoroughly rinsed off with water. Alternatively, the hand-grip holders can be cleaned mechanically with heat-disinfection up to a maximum temperature of 93°C/10 min.

For disinfecting the handle sleeves we recommend products with an alcohol or aldehyde base. The sleeves must be rinsed before sterilization.

The handles can be sterilized in steam. The recommended parameters are:

1. Steam sterilization at 121° C; 1.3 bar (18.9 PSI); 25 to 30 minutes
2. Steam sterilization at 134° C; 2.3 bar; (33.3 PSI); 4 minutes

When filling the autoclave ensure that the open side of the handles are face down. The sleeves must lie free and must not come into contact with any other items being sterilized.

Hot-air sterilization is not recommended by BERCHTOLD. However, if it is necessary, the handles should be sterilized at 134° C; 3 minutes.



**Note:**

***Sterilizable handles are subject to natural wear.***

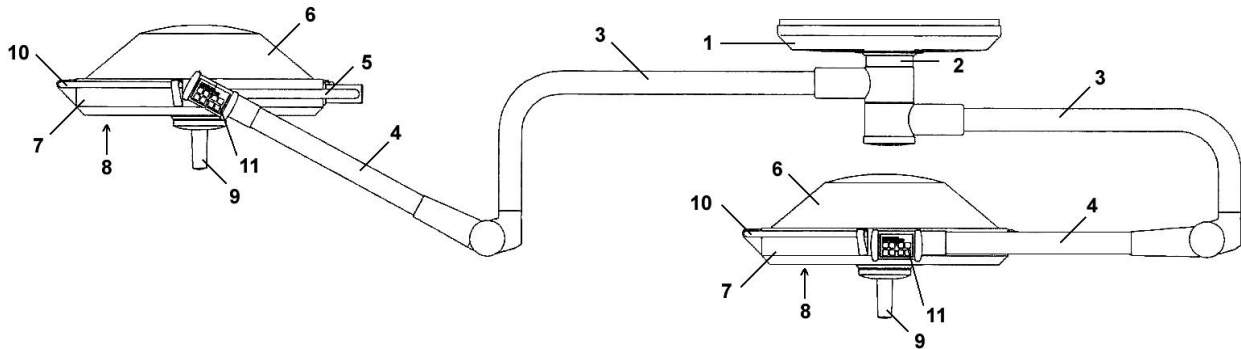
***As a rule, a life of approx. 100 cleaning cycles is normal.***

***Damaged grip sleeves must not continue to be used.***

***The operator should refer to recognized standards for hygiene and disinfection***

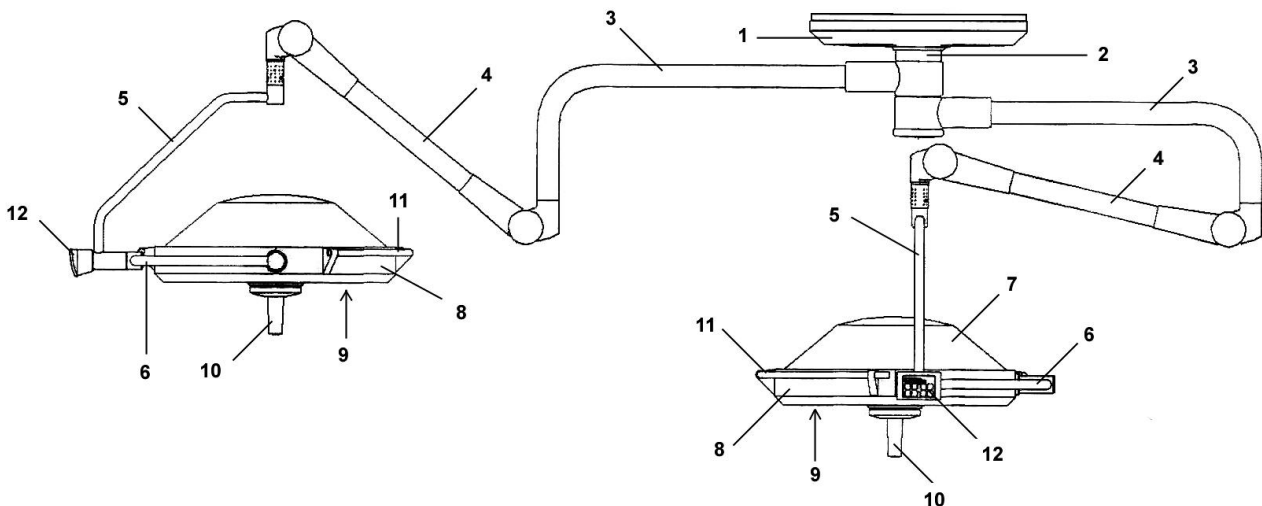
### 3. COMPONENTS

#### 3.1 CHROMOPHARE® D 660 / D 660, / D 540 or / D 510 (flat cardanic)



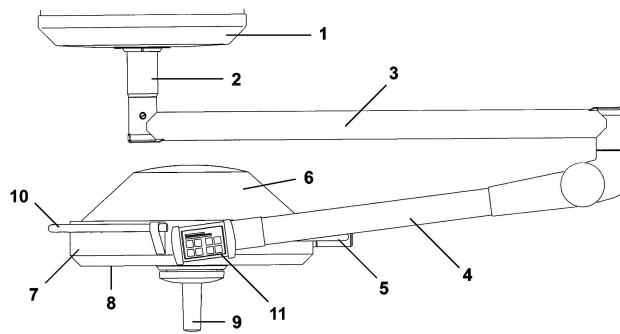
- |   |                                  |    |                             |
|---|----------------------------------|----|-----------------------------|
| 1 | Ceiling cover                    | 7  | Lamp frame                  |
| 2 | Flange tube $\varnothing$ 125 mm | 8  | Light emission lens         |
| 3 | Horizontal swivel arm            | 9  | Sterilizable handle         |
| 4 | Vertical spring arm              | 10 | Rail (encircling hand grip) |
| 5 | Horizontal gimbal joint          | 11 | Control panel               |
| 6 | Lamp housing hood                |    |                             |

#### 3.2 CHROMOPHARE® D 660 / D 660, / D 540 or / D 510 (classic cardanic)



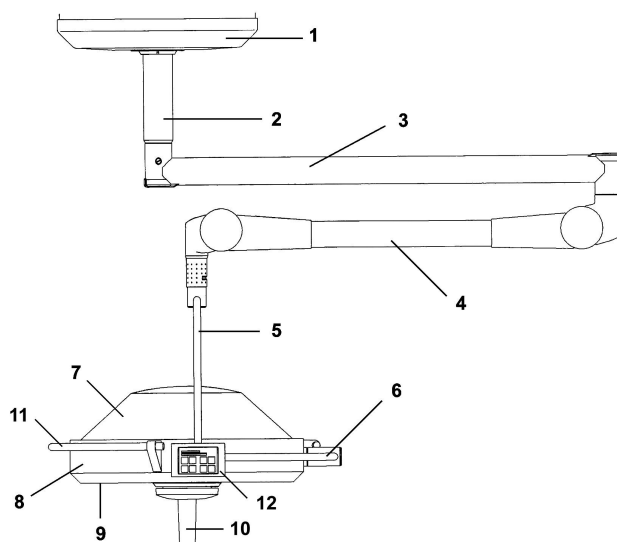
- |   |                                  |    |                             |
|---|----------------------------------|----|-----------------------------|
| 1 | Ceiling cover                    | 7  | Lamp housing hood           |
| 2 | Flange tube $\varnothing$ 125 mm | 8  | Lamp frame                  |
| 3 | Horizontal swivel arm            | 9  | Light emission lens         |
| 4 | Vertical spring arm              | 10 | Sterilizable handle         |
| 5 | Vertical gimbal joint            | 11 | Rail (encircling hand grip) |
| 6 | Horizontal gimbal joint          | 12 | Control panel               |

### 3.3 CHROMOPHARE® D 540 and D 510 (flat cardanic)



- 1 Ceiling cover
- 2 Flange tube  $\varnothing$  65 mm
- 3 Horizontal swivel arm
- 4 Vertical spring arm
- 5 Horizontal gimbal joint
- 6 Lamp housing hood
- 7 Lamp frame
- 8 Light emission lens
- 9 Sterilizable handle
- 10 Rail (encircling hand grip)
- 11 Control panel

### 3.4 CHROMOPHARE® D 540 and D 510 (classic cardanic)

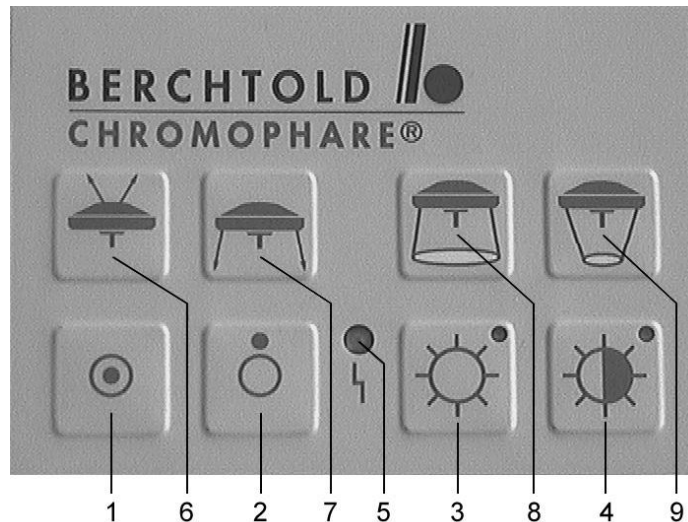


- 1 Ceiling cover
- 2 Flange tube  $\varnothing$  65 mm
- 3 Horizontal swivel arm
- 4 Vertical spring arm
- 5 Vertical gimbal joint
- 6 Horizontal gimbal joint
- 7 Lamp housing hood
- 8 Lamp frame
- 9 Light emission lens
- 10 Sterilizable handle
- 11 Rail (encircling hand grip)
- 12 Control panel

## 4. OPERATION

### 4.1 Control panel and symbols CHROMOPHARE® D 660

The following functions can be controlled by the control panel:



- |          |   |
|----------|---|
| 1 ON     | Switch on the light   |
| 2 OFF    | Switch off the light  |
| 3 Bright | Increase intensity (the reach of the maximum intensity will be displayed by a light emitting diode) |
| 4 Dark   | Decrease intensity (the reach of the minimum will be displayed by a light emitting diode)           |
| 5 Fault  | LED indicates that the control unit has a fault   |

#### Options:

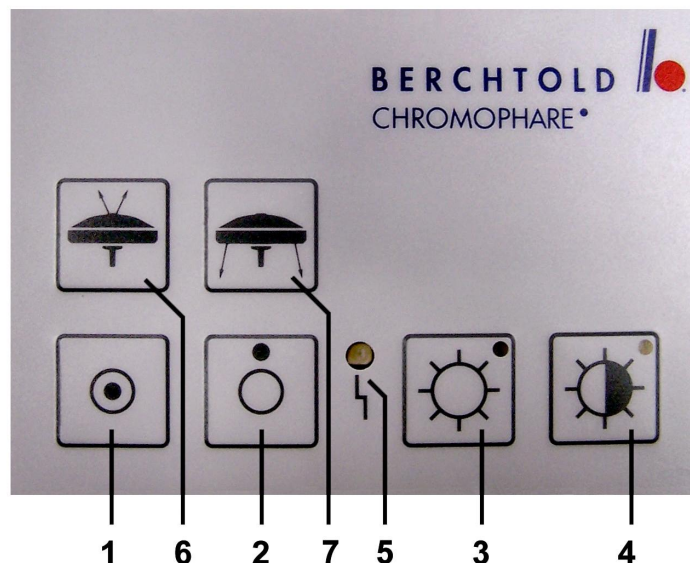
- |                    |  |
|--------------------|--|
| 6 EndoLite®        | Switch from surgical area light to surround light (only with option EndoLite®) |
| 7 OR light         | Switch from surround light to surgical area light (only with option EndoLite®) |
| 8 Field size large | Enlarge field size (only with option LFN)                                      |
| 9 Field size smal  | Reduce field size (only with option LFN)                                       |

- ON** The OR light is switched on by pressing **key 1**.
- OFF** The OR light is switched off by pressing **key 2**.
- Bright** By pressing and holding down **key 3** the illuminance is continuously increased up to the maximum value. Repeated short presses increase the illuminance in steps.
- Dark** By pressing and holding down **key 4** the illuminance is continuously reduced down to the minimum value. Repeated short presses decrease the illuminance in steps.
- Fault** If the indicator light shows **red**, there is a fault in the control unit electronics.
- EndoLite®** Only with the EndoLite® option. By pressing **key 6** EndoLite® the surgical area illumination is switched off and the surround lighting is switched on.

- OR light** Only with the EndoLite® option. By pressing **key 7** the EndoLite® surround lighting is switched off and the surgical area lighting is switched on again.
- Field size large** Only with the LFN model. By pressing and holding down **key 8** the light field is continuously enlarged up to the maximum value. Repeated short presses enlarge the light field in steps.
- Field size small** Only with the LFN model. By pressing and holding down **key 9** the light field is continuously reduced down to the minimum value. Repeated short presses reduce the light field in steps.

#### 4.2 Control panel and symbols CHROMOPHARE® D 540 and D 510 with “light intensity control” and EndoLite® (only in conjunction with option “light intensity control”)

The following functions can be controlled by the control panel:



- |          |   |
|----------|---|
| 1 ON     | Switch on the light   |
| 2 OFF    | Switch off the light  |
| 3 Bright | Increase intensity (the reach of the maximum intensity will be displayed by a light emitting diode) |
| 4 Dark   | Decrease intensity (the reach of the minimum intensity will be displayed by a light emitting diode) |
| 5 Fault  | LED indicates that the control unit has a fault   |

#### Options:

- |             |  |
|-------------|--|
| 6 EndoLite® | Switch from surgical area light to surround light (only with option EndoLite®) |
| 7 OR light  | Switch from surround light to surgical area light (only with option EndoLite®) |

**ON** The OR light is switched on by pressing **key 1**.

**OFF** The OR light is switched off by pressing **key 2**.

**Bright** By pressing and holding down **key 3** the illumination is continuously increased up to the maximum value. Repeated short presses increase the illumination in steps.

**Dark** By pressing and holding down **key 4** the illumination is continuously reduced down to the minimum value. Repeated short presses decrease the illumination in steps.

**Fault** If the indicator light shows **red**, there is a fault in the control unit electronics.

**Option:**

**EndoLite®** Only with the EndoLite® option. By pressing **key 6** the surgical area illumination is switched off and the surround lighting is switched on.

**OR light** Only with the EndoLite® option. By pressing **key 7** the EndoLite® surround lighting is switched off and the surgical area lighting is switched on again.

#### 4.3 Control panel and symbols CHROMOPHARE® D 510 (without option “light intensity control”)

The following functions can be controlled by the control panel:



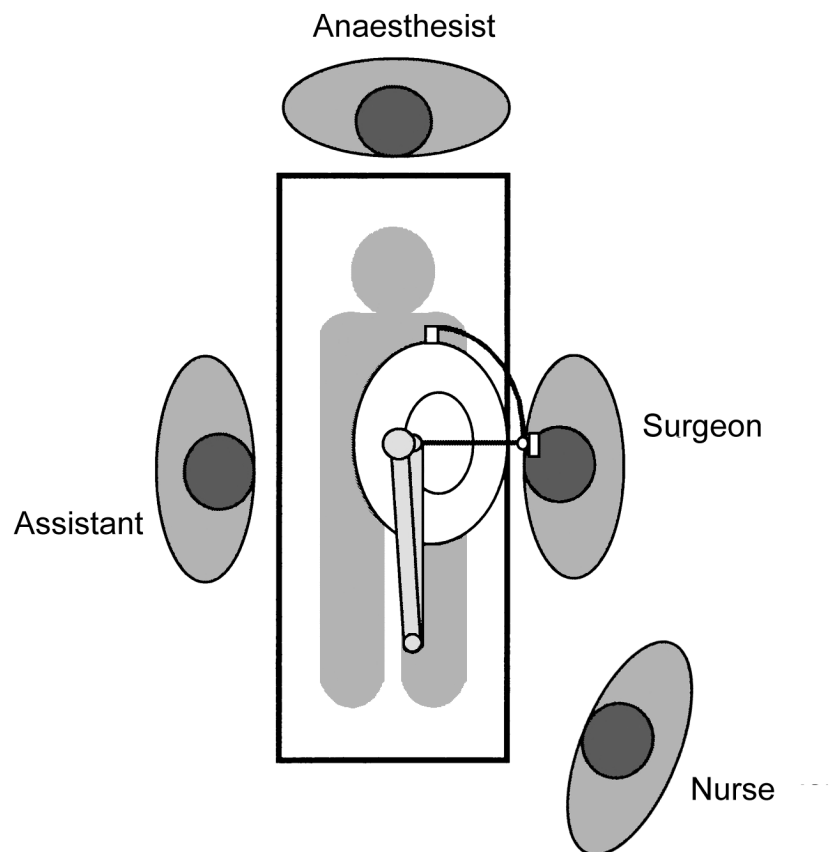
1 ON	Switch on the light
2 OFF	Switch off the light

**ON** The OR light is switched on by pressing **key 1**.

**OFF** The OR light is switched off by pressing **key 2**.

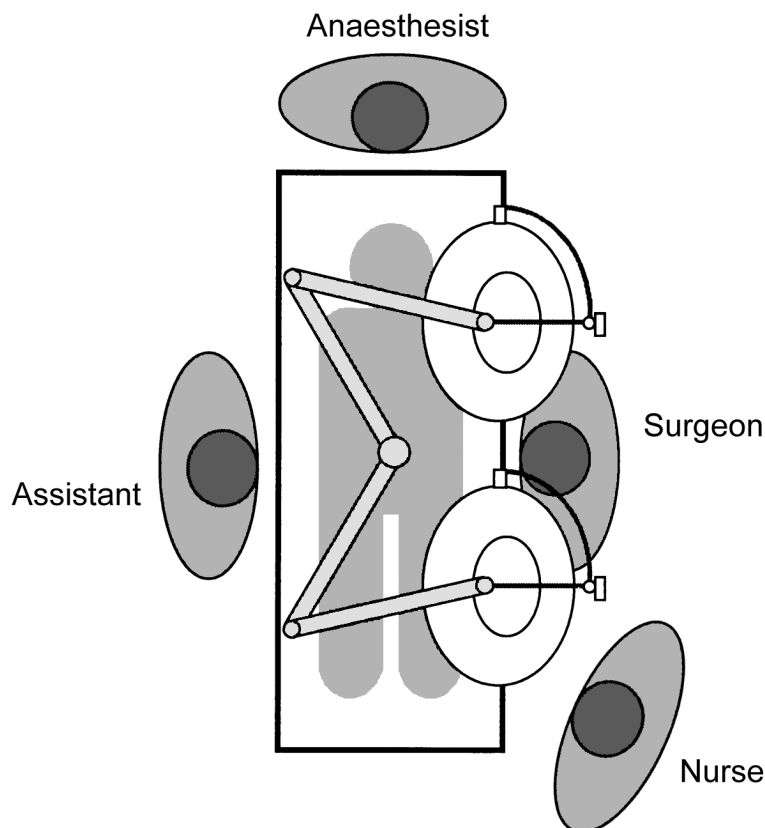
#### 4.4 Notes on operation and positioning the lights

Before an operation the lamp housing should be placed in an initial position, so that it can later be easily adjusted both horizontally and vertically. In the case of a single light, it is positioned over the center of the surgical area (see illustration 1). The distance from the lower edge of the light to the operating table is approx. 1.15 m (45"). Initial positioning is accomplished by using the rail on the lamp housing (D 510 optional). The surgeon has the option of adjusting the light using the center hand grip, which is provided with a replaceable sterilized sleeve. In the case of combination lights the main light is positioned over the center of the surgical area and the additional light over the foot area.



The light should be set in the basic position so that the position of the lamp housing may be changed easily without using force and the control unit can be reached easily by “non-sterile” personnel to adjust the brightness.

In the case of a combination light the lamp housings are positioned so that the light fields of both lights are coincident. The operator should consider the following: The light's adjustment to maximum illumination causes an increased desiccation of the tissue. Swivel and spring arms are positioned in the basic setting as shown in illustration 2. With this arrangement the position of the lamps can be easily changed without using undue force.



In the case of a combination light the basic setting is in accordance with illustration 2. In this arrangement both lamps can be easily moved, and the control units of both lamps can be easily reached by “non-sterile” personnel. In operations in which it is necessary to intervene at two separate points as may be the case, for example, in a by-pass procedure, the two lamps are positioned above the two points of intervention as if they were single lights.



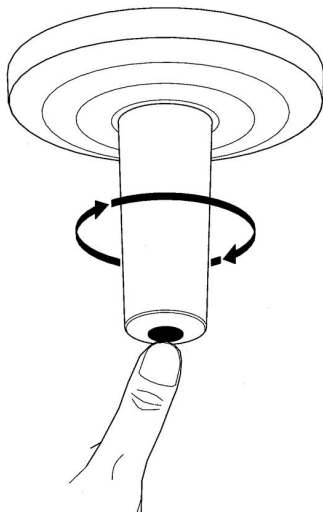
#### 4.4.1 Adjusting the field size

##### CHROMOPHARE® D 660, D 540, D 510 (with option “ field size adjustment”)

By turning the sterilizable center hand grip the size of the light field is changed. By turning the hand grip in the clockwise direction the light field is enlarged, by turning counter-clockwise the light field is reduced. The surgeon must perform the optimum field setting himself in accordance with the size of the operation opening. There is an optimum contrast when the field size is set approx. 1 cm larger than the operation opening, so that the edge of the sterile covering is also illuminated. The adaptation of the surgeon's eyes is, therefore, improved in the whole field of vision.

On CHROMOPHARE® D 660 with the Light pilot option, the adaption of the field diameter is done at the control panel (please see chapter 4.1).

#### 4.4.2 Changing the sterilizable handles



##### Operating lights CHROMOPHARE® D-Generation

By pressing the release button the handle is released and can be removed from the sleeve mounting.

The new, sterilized replacement sleeve is pushed onto the sleeve mounting until it touches the stop and is then turned in a clockwise direction until the sleeve locks into place.

#### 4.5 Accessories for CHROMOPHARE® operating lights

##### 4.5.1 Sterilizable handles

- |  |                     |
|--|---------------------|
| • Standard replacement sleeve (D 660, D 540 and D 510)             | Order no. CZ 499-06 |
| • Replacement sleeve for LFN (D 660)                               | Order no. CZ 498-04 |
| • Replacement sleeve for light system with ChromoVision® AFII & FZ | Order no. CZ 498-08 |

##### *Note*

*Each CHROMOPHARE® light is delivered with two sterilizable handles.*

*For directions about cleaning disinfection and sterilization, see chapter 2.6.*

##### 4.5.2 Illuminants (reserve bulb)

##### CHROMOPHARE® D 660, D 540 and D 510

- |              |               |                     |
|--------------|---------------|---------------------|
| • BRITe-bulb | 22.8 V/ 150 W | Order no. CZ 909-22 |
|--------------|---------------|---------------------|

## 4.6 System variants

The CHROMOPHARE® D generation is available in the following system variants:

1. CHROMOPHARE® D 660 as a combination light with D 540 or D 510
2. CHROMOPHARE® D 540 as a combination light with D 660 or D 510
3. CHROMOPHARE® D 540 as a mobile light (with transformer or battery)
4. CHROMOPHARE® D 540 as a wall light
5. CHROMOPHARE® D 510 as a single, double and triple light
6. CHROMOPHARE® D 510 as a mobile light (with transformer)

## 5. OPTIONS

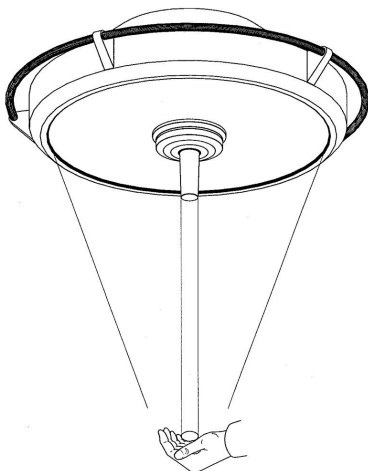
### 5.1 Options for CHROMOPHARE® D generation

The CHROMOPHARE® D generation can be supplemented or upgraded with the following options:

- Light carrier arm for up to 11 kg load with AC and grounding connections for an auxiliary device (only possible if the light has been prepared for an additional arm in advance).
- Monitor support arm for up to 10 kg load with AC and Video connections for LCD-Monitor.
- Double monitor support arm for up to 27 kg load with AC and Video connections for two LCD monitors.
- Wall control unit for installation into a wall indicator panel. Functions such as switching on / off and brightness of the OR light can then be controlled from the wall (not upgradeable).
- External camera support arm for up to 5.1 kg load for mounting an external camera.

### 5.2 Light Pilot System LFN (only for CHROMOPHARE® D 660)

The CHROMOPHARE® D 660 can be ordered with an LFN System as an option. The LFN System is an electronic control system, which moves the lamps by electric motor. An infrared beam which is reflected by a reflector disk controls the LFN System.



The operator can direct the light field to the position which guarantees optimum illumination of the surgical area, by means of a reflector disk, the so-called "Light Pilot".

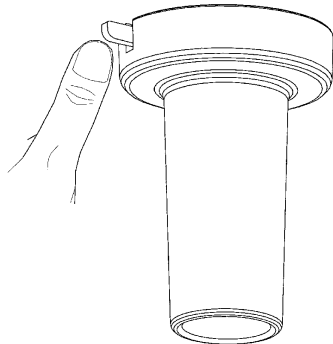
The "Light Pilot" should be held in the center of the light field as far as possible and then slowly moved to the desired position. If movement is too quick, the light field will not be able to follow the "Light Pilot".

This rule is: Wherever the light field is, the "Light Pilot" will be hit by the infrared beam and can reflect the beam back.

### 5.2.1 Adjusting the field size for LFN model CHROMOPHARE® D 660

The CHROMOPHARE® D 660 with LFN allows the field size to be adjusted by an electric motor. By pressing and holding down key 8 the light field is continuously enlarged up to the maximum value. By repeated short presses the light field is enlarged in steps. By pressing and holding down key 9 the light field is continuously reduced down to the minimum value. By repeated short presses the light field is reduced in steps.

### 5.3 Changing the sterilizable handles - LFN model



The sterilizable hand grip sleeve is released by pressure on the bolt on the upper collar of the sleeve. It can then be removed from the sleeve mounting. The new sterilized replacement sleeve is pushed onto the sleeve mounting until it touches the stop and is then turned in a clockwise direction until the sleeve is heard locking into place.

### 5.4 Accessoires for CHROMOPHARE® D 660 LFN model - Light Pilot

- Light Pilot for single LFN (resp. 10 pieces)                      Order no. CZ 498-10
- Light Pilot for multiple LFN (resp. 10 pieces)                      Order no. CZ 498-20

#### *Note!*

*The “Light Pilot” can be cleaned and disinfected with normal detergents and disinfectants or gas-sterilized to a maximum temperature of 70°. “The Light Pilot” must not be sterilized with steam or hot air. This device is designed for approximately 10 sterilization-cycles and is supplied non-sterilized.*

### 5.5 EndoLite®

The CHROMOPHARE® D 660, D 540 and D 510 (only in conjunction with option “light intensity control”) model can be ordered with an optional environment illumination function (EndoLite®) for endoscopic operations. Room illumination with greatly reduced intensity is often installed for endoscopic operations so as not cause a disturbance to surgeons or operators and to facilitate observation of the monitors. It is also possible to install the EndoLite® option at a later date in the CHROMOPHARE® D 660, D 540 and D 510 lamp. Operating room illumination is obtained by means of a 20 W halogen lamp incorporated in the lamp body housing, and directing light upwards.



By pressing key 6 “EndoLite®” the surgical area illumination is switched off and the surround lighting is switched on.

By pressing key 7 “OR-light” again, the EndoLite® surround lighting is switched off and the surgical lighting is switched on again.

Reserve bulb 12 V/20 W    Order no. CZ 960-12

## 5.6 Camera system

**(D 510 ChromoVision® AFII or HR24 only in conjunction with option “light field size adjustment”)**

You can order our CHROMOPHARE D 660, D 540 and D 510 either with a BERCHTOLD camera system ChromoVision® AF II (HR24) or ChromoVision® FZ (Pal or NTSC). Note that the camera system can be installed in a standard model at a later date provided that the lamp already being used is designed for installation of the camera system. If you use the camera system please note that you cannot use the option LFN.

The BERCHTOLD ChromoVision® camera system allows the user to record the various phases of an operation for didactic and documentary purposes. In the BERCHTOLD ChromoVision® system a camera is fitted in the central hand grip of the lamp, which can be worked by means of an external control.

It is possible to obtain live viewing of an operation with a monitor or record an operation with video-recording equipment.

The use and characteristics of the lamp are, generally speaking, unvaried whenever a camera is used. The light field width cannot be adjusted however when the television function is used. Use and installation of the camera system are illustrated separately in the “Operating Instructions” of the ChromoVision® model.

## 6. MAINTENANCE

### 6.1 Identification of the serial number and symbols used on the type plate

The type plate for the surgical light is located on the light head directly beside the control panel.



#### Type plate

- 1 Version number
- 2 Variation
- 3 Manufacturing year
- 4 Serial number
- 5 EC certification
- 6 Symbol for camera preparation
- 7 Health Industry Bar Code

The CHROMOPHARE® lights should be serviced once a year (maintenance contract). Maintenance should only be performed by BERCHTOLD or by a company authorized by BERCHTOLD (see notes on product liability). Before performing any ordinary maintenance, power to the light heads should be disconnected.

### 6.2 Notes on changing fuse

In this lamp, the mains fuses and the fuses for the emergency power supply are not located in the flange under the cover but are located externally, in the switchboard and electric control panel respectively, so as to allow for easy replacement in the case of an illumination failure.

**The value of fuse are withdraw from the CHROMOPHARE® mounting instruction for ceiling lights.**

### 6.3 Instructions for changing bulbs



The BRITe-bulb has an average life of 1000 hours. In the event of failure of the main lamp, switch over to a reserve lamp occurs automatically and the reserve lamp swivels automatically into the former position of the main lamp (D 510 optional).

A yellow indicator light up on the lamp housing when the lamp safety system has switched over to the reserve lamp. The defective main lamp should then be exchanged as quickly as possible.

The bulbs must be replaced in the following manner:



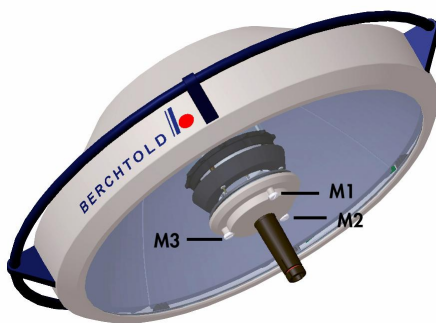
#### Attention!

If changing the bulb, please wear glasses!



The symbol “Danger - Risk of Burning” is placed on the lamp support.

Do not touch the quartz cone of the illuminant with your bare fingers, use a cloth or soft paper.



Switch off the lighting system and let it cool down (risk of burning).

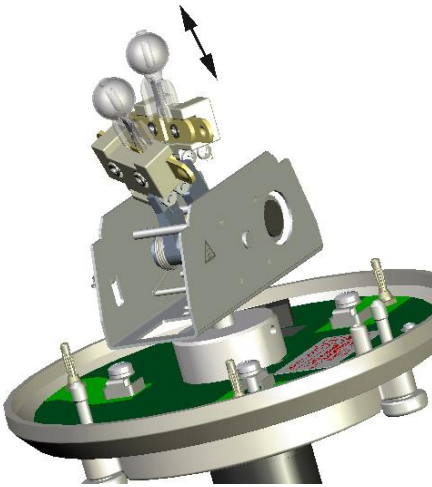
Release and remove sterilizable hand grip before.

Unscrew the knurled screw (M1 – M3) on the underside of the light by turning counter-clockwise.



Pull out the whole light system at the hand grip.

Remove the faulty bulb. We advise users to insert the reserve bulb (optional) into the main light bulb holder, marked with <R>, and to insert the new bulb in the reserve bulb holder so that the reserve bulb maintains adequate life.



Fit a new BRITe-bulb into the bulb holder, - for the booking reference number see chapter 4.5.2 Illuminants - (do not touch the quartz cone of the BRITe-bulb with your bare fingers, use a cloth or soft paper). During a lamp change check the bulb holder for scorch marks. If scorch marks are present, inform BERCHTOLD service department.



Fit the light system back into the holder and screw the knurled screws in a clockwise direction.

Switch the lighting system on and check that the lamp is on and the red indicator light is off (D 510 optional).

**Note!**


**Only use original BERCHTOLD BRITe-bulbs. If other bulbs are used, all guarantees regarding performance and operation will be void.**

## 7. TECHNICAL DATA

### 7.1 CHROMOPHARE® D 660

Light technical data	D 660
Reflector system	Polygonreflector
Colour temperature	4300 K
Intensity Ec at 1 m	160 [klx]
Intensity control	80 - 160 [klx]
Total radiant power at max intensity	560 W/m <sup>2</sup>
Total radiant power/intensity Ec	3.5 [mW/m <sup>2</sup> lx]
Colour rendering index R <sub>a</sub>	93
a <sub>cv</sub>	0.58
Light field diameter	17 - 30 cm
d <sub>10</sub> Light field dia. at 10 % of max intensity	17 cm
d <sub>50</sub> Light field dia. at 50 % of max intensity	8.5 cm
Remaining illuminance when beam is obstructed by one mask	47 %
Remaining illuminance when beam is obstructed by two masks	45 %
Remaining illuminance inside at the bottom of a standardized tube	100 %
Remaining illuminance inside at the bottom of a standardized tube. Beam obstructed by one mask	47 %
Remaining illuminance inside at the bottom of a standardized tube. Beam obstructed by two masks	45 %
Depth of illumination L1 + L2	120 cm
<b>Electrical data</b>	
Primary voltage of transformer	100 / 120 / 127 V A.C. 220 / 230 / 240 V A.C.
Power consumption transformer/switching power supply	240 VA or 170 AV at 24 V D.C.
Rated capacity of transformer/switching power supply, frequency	240 VA / 50/60 Hz
Safety Category	1
Protection provided by enclosure	IP 53




<b>General data</b>	<b>D 660</b>
BRITe-bulb Order no.	22.8 V / 150 W CZ 909-22
Life time of BRITe-bulb	1000 h
Automatic switch over to reserve bulb	yes
<b>Dimensions</b>	
Diameter of light body	65 cm
Diameter of polygonreflector	58.5 cm
Light emission surface (glass surface)	2370 cm <sup>2</sup>
Max. swivel radius	237 cm
Lowest position of light body (N.C.)	128 cm
Highest position of light body (N.C.)	254 cm
Lowest position of light body (A.C.)	102 cm
Highest position of light body (A.C.)	225 cm
Clearance (single light)	200 cm at 265 cm finished ceiling
<b>Weight / Torque</b>	
Weight with transformer/switching power supply	50 kg
Max. torque	342 Nm
<b>Certifications</b>	 Conformity with 93/42 EEC UL classified

Light technical data  $\pm 10 \%$



## 7.2 CHROMOPHARE® D 540


Light technical data	D 540
Reflector system	Polygonreflector
Colour temperature	4300 K
Intensity Ec at 1 m	145 [klx]
Intensity control	72.5 - 145 [klx]
Total radiant power at max intensity	507 W/m <sup>2</sup>
Total radiant power/intensity Ec	3.5 [mW/m <sup>2</sup> lx]
Colour rendering index R <sub>a</sub>	93
a <sub>cv</sub>	0.58
Light field diameter	17 - 28 cm
d <sub>10</sub> Light field dia. at 10 % of max intensity	17 cm
d <sub>50</sub> Light field dia. at 50 % of max intensity	8.5 cm
Remaining illuminance when beam is obstructed by one mask	22 %
Remaining illuminance when beam is obstructed by two masks	45 %
Remaining illuminance inside at the bottom of a standardized tube	100 %
Remaining illuminance inside at the bottom of a standardized tube. Beam obstructed by one mask	22 %
Remaining illuminance inside at the bottom of a standardized tube. Beam obstructed by two masks	45 %
Depth of illumination L1 + L2	125 cm
<b>Electrical data</b>	
Primary voltage of transformer	100 / 120 / 127 V A.C. 220 / 230 / 240 V A.C.
Power consumption transformer/switching power supply	240 VA or 170 VA at 24 V D.C.
Rated capacity of transformer/switching power supply, frequency	240 VA 50/60 Hz
Safety Category	1
Protection provided by enclosure	IP 53

<b>General data</b>	<b>D 540</b>
BRITe-bulb Order no.	22.8 V / 150 W CZ 909-22
Life time of BRITe-bulb	1000 h
Automatic switch over to reserve bulb	yes
<b>Dimensions</b>	
Diameter of light body	52 cm
Diameter of polygonreflector	45.5 cm
Light emission surface (glass surface)	1374 cm <sup>2</sup>
Max. swivel radius	231 cm
Lowest position of light body (N.C.)	130 cm
Highest position of light body (N.C.)	219 cm
Lowest position of light body (A.C.)	112 cm
Highest position of light body (A.C.)	213 cm
Clearance (single light)	200 cm at 245 cm finished ceiling
<b>Weight / Torque</b>	
Weight with. transformer/switching power supply	35 kg
Max. torque	269 Nm
<b>Certifications</b>	 Conformity with 93/42 EEC UL classified

Light technical data  $\pm 10\%$

### 7.3 CHROMOPHARE® D 510

<b>Light technical data</b>	<b>D 510</b>
Reflector system	Polygonreflector
Colour temperature	4300 K
Intensity Ec at 1 m	130 [klx]
Intensity control (electronic)	65 - 130 [klx] (optional)
Total radiant power at max intensity	455 W / m <sup>2</sup>
Total radiant power / intensity Ec	3.5 [mW / m <sup>2</sup> lx]
Colour rendering index R <sub>a</sub>	93
a <sub>cv</sub>	0.58
Light field adjustment	17 - 28 (optional)
d <sub>10</sub> Light field dia. at 10 % of max intensity	17 cm
d <sub>50</sub> Light field dia. at 50 % of max intensity	8.5 cm
Remaining illuminance when beam is obstructed by one mask	22 %
Remaining illuminance when beam is obstructed by two masks	45 %
Remaining illuminance inside at the bottom of a standardized tube	100 %
Remaining illuminance inside at the bottom of a standardized tube. Beam obstructed by one mask	22 %
Remaining illuminance inside at the bottom of a standardized tube. Beam obstructed by two masks	45 %
Depth of illumination L1 + L2	125 cm
<b>Electrical data</b>	
Primary voltage of transformer	100 / 120 / 127 V A.C. 220 / 230 / 240 V A.C.
Power consumption transformer/switching power supply	240 VA or 170 VA at 24 V D.C.
Rated capacity of transformer/power switching supply, frequency	240 VA / 50/60 Hz
Safety Category	1
Protection provided by enclosure	IP 53

<b>General data</b>	<b>D 510</b>
BRITe-bulb Order no.	22.8 V / 150 W CZ 909-22
Life time of BRITe-bulb	1000 h
Automatic switch over to reserve bulb	yes (optional)
<b>Dimensions</b>	
Diameter of light body	52 cm
Diameter of polygonreflector	45.5 cm
Light emission surface (glass surface)	1374 cm <sup>2</sup>
Max. swivel radius	231 cm
Lowest position of light body (N.C.)	130 cm
Highest position of light body (N.C.)	219 cm
Lowest position of light body (A.C.)	112 cm
Highest position of light body (A.C.)	213 cm
Clearance (single light)	200 cm at 245 cm ceiling high
<b>Weight / Torque</b>	
Weight with. transformer/switching power supply	35 kg
Max. torque	269 Nm
<b>Certifications</b>	 Conformity with 93/42/EEC UL classified

Light technical data  $\pm 10 \%$

## 8. APPENDIX A

### 8.1 Information about the electromagnetic compatibility (EMC)

Medical electrical Equipment, so as the attached one, needs special precautions regarding EMC and needs to be installed and put into service according to the information provided in the user manual.

Guidance and manufacturer's declaration – electromagnetic emissions		
The CHROMOPHARE lights are intended for use in the electromagnetic environment specified below. The customer or the user of the CHROMOPHARE lights should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR11	Group 1	The CHROMOPHARE lights uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.  The CHROMOPHARE lights are suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
The CHROMOPHARE lights are intended for use in the electromagnetic environment specified below. The customer or the user of the CHROMOPHARE lights should assure that it is used in such an environment.			
Immunity test	IEC 60601-test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Synthetic floors should be antistatic and the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % $U_T$ for ½ cycle (> 95 % dip) 40 % $U_T$ for 5 cycles (60 % dip) 70 % $U_T$ for 25 cycles (30 % dip) < 5 % $U_T$ for 5 s (> 95 % dip)	< 5 % $U_T$ for ½ cycle (> 95 % dip) 40 % $U_T$ for 5 cycles (60 % dip) 70 % $U_T$ for 25 cycles (30 % dip) < 5 % $U_T$ for 5 s (> 95 % dip)	Mains power quality should be that of a typical commercial or hospital environment.  For continued operation during power mains interruptions, the CHROMOPHARE lights should be connected to an uninterruptible power supply or a battery.
Radiated electric field IEC 61000-4-3	3 V/m 80 MHz bis 2,5 GHz	3 V/m 80 MHz bis 2,5 GHz	If image distortion occurs by lights with camera system, it may be necessary to position the sources of electric fields further from the lights or install shielding.
NOTE: $U_T$ is the a.c. mains voltage prior to application of the test level.			

